WHAT IS CLAIMED IS:

1. A halftone generation system for generating halftone data of a pixel based on comparison between multilevel image data of the pixel and threshold matrix data,

said halftone generation system comprising:

threshold matrix data storage means for storing threshold matrix data;

threshold data read means for reading all threshold data applied to halftone data generation processing for one scanning line from said threshold matrix data storage means;

first register means for retaining all the read threshold data applied to halftone data generation processing for the scanning line;

threshold data selection means for selecting a plurality of threshold data pieces from among all the threshold data pieces applied to halftone data generation processing for the scanning line retained in said first register means and outputting the selected threshold data pieces; and

a plurality of comparison means for performing comparison processing between the threshold data pieces selected by said threshold data selection means and multilevel image data of a plurality of pixels in parallel and executing parallel generation processing of halftone data of the pixels.

2. A halftone generation system for generating halftone data

of a pixel based on comparison between multilevel image data of the pixel and threshold matrix data in painting object units,

said halftone generation system comprising:

threshold matrix data storage means for storing threshold matrix data;

threshold data read means for reading all threshold data applied to halftone data generation processing for one scanning line from said threshold matrix data storage means in response to the start position of a painting object;

first register means for retaining all the read threshold data applied to halftone data generation processing for the scanning line;

threshold data selection means for selecting a plurality of threshold data pieces from among all the threshold data applied to halftone data generation processing for the scanning line retained in said first register means and outputting the selected threshold data pieces; and

a plurality of comparison means for performing comparison processing between the threshold data pieces selected by said threshold data selection means and multilevel image data of a plurality of pixels in parallel and executing parallel generation processing of halftone data of the pixels.

3. The halftone generation system as claimed in claim 1 ~~or~~ ~~2~~, wherein

said data read means comprises; second register means for retaining all threshold data applied to halftone data generation processing for the scanning line to be processed next to the current scanning line where halftone data generation processing is being executed,

said threshold data read means reads all threshold data applied to halftone data generation processing for the scanning line to be processed next to the current scanning line from said threshold matrix data storage means, and outputs the read threshold data to said second register means, and

the threshold data retained in said second register means is output to said first register means.

4. The halftone generation system as claimed in claim 3, wherein

the parallel generation processing of halftone data of the pixels in said plurality of comparison means and the reading of all threshold data applied to halftone data generation processing for the scanning line to be processed next to the current scanning line from said threshold matrix data storage means, and the output processing of the read threshold data to said second register means in said threshold data read means are performed in parallel.

5. The halftone generation system as claimed in ~~any of claims~~ Claim 1

A ~~1 to 4,~~ wherein

said threshold data selection means comprises; as many selector circuits as the number of halftone data pieces generated in parallel in said plurality of comparison means, and

input of each of said selector circuits is connected to output of said first register means at intervals of as many as the number of halftone data pieces generated in parallel in said plurality of comparison means, and output of each of the selector circuits is switched in response to the pixel position of halftone data generated in parallel.

6. The halftone generation system as claimed in claim 5, wherein

said first register means comprises; a shift circuit for circularly shifting the retained threshold data, and

said shift circuit shifts the retained threshold data by as many threshold data pieces as the number of threshold data pieces in said first register means not output through said selector circuits to said plurality of comparison means.

7. The halftone generation system as claimed in claim 5, wherein

said first register means comprises; a first register at the preceding stage, and a first register at the following stage,

input of each of said selector circuits is connected to

output of said first register at the following stage at intervals of as many as the number of halftone data pieces generated in parallel in said plurality of comparison means,

said first register at the preceding stage comprises; a shift circuit for circularly shifting the retained threshold data,

said shift circuit shifts the retained threshold data in said first register at the preceding stage by as many threshold data pieces as the number of threshold data pieces in said first register at the following stage not output through said selector circuits to said plurality of comparison means, and

the threshold data shifted in said first register at the preceding stage is output to said first register at the following stage.

8. The halftone generation system as claimed in claim 7, wherein

the parallel generation processing of halftone data of the pixels in said plurality of comparison means, and the threshold data shift processing in said first register at the preceding stage are performed in parallel.

9. The halftone generation system as claimed in ~~any of claims~~ claim 3 ~~to 8~~, wherein

said threshold data read means outputs a shift signal for

specifying a threshold data shift amount for said second register means, and

the shift signal indicates the shift amount for causing a start position of a painting object and a threshold data storage location to match.

10. The halftone generation system as claimed in claim 9, wherein

said second register means comprises; a second register at the preceding stage, and a second register at the following stage,

the threshold data read from said threshold matrix data storage means is retained in said second register at the preceding stage, then is output to the second register at the following stage,

said threshold data read means outputs a shift signal for specifying a threshold data shift amount for said second register at the following stage,

said second register at the following stage shifts the retained threshold data in response to the shift signal, and

the threshold data shifted in said second register at the following stage is output to said first register means.

11. The halftone generation system as claimed in claim 10, wherein

the parallel generation processing of halftone data of the pixels in said plurality of comparison means, and the threshold data shift processing in said second register at the following stage are performed in parallel.

12. The halftone generation system as claimed in claim 2, wherein

said threshold data read means controls the number of threshold data pieces to be read from said threshold matrix data storage means in response to the number of pixels of a painting object on a scanning line to which processing is applied.

13. The halftone generation system as claimed in claim 1 or 2, wherein

said threshold data read means reads a plurality of threshold data pieces at the same time from said threshold matrix data storage means.

14. A halftone generation method for generating halftone data of a pixel based on comparison between multilevel image data of the pixel and threshold matrix data,

said halftone generation method comprising:

the threshold data read step of reading all threshold data applied to halftone data generation processing for one scanning line from threshold matrix data storage means;

the step of retaining all the read threshold data applied to halftone data generation processing for the scanning line in first register means;

the threshold data selection step of selecting a plurality of threshold data pieces from among all the threshold data applied to halftone data generation processing for the scanning line retained in said first register means and outputting the selected threshold data pieces; and

the comparison step in a plurality of comparison means for performing comparison processing between the threshold data pieces selected at said threshold data selection step and multilevel image data of a plurality of pixels in parallel and executing parallel generation processing of halftone data of the pixels.

15. A halftone generation method for generating halftone data of a pixel based on comparison between multilevel image data of the pixel and threshold matrix data in painting object units,

said halftone generation method comprising:

the threshold data read step of reading all threshold data applied to halftone data generation processing for one scanning line from threshold matrix data storage means in response to the start position of a painting object;

the step of retaining all the read threshold data applied to halftone data generation processing for the scanning line in

first register means;

the threshold data selection step of selecting a plurality of threshold data pieces from among all the threshold data applied to halftone data generation processing for the scanning line retained in said first register means and outputting the selected threshold data pieces; and

the comparison step in a plurality of comparison means for performing comparison processing between the threshold data pieces selected at said threshold data selection step and multilevel image data of a plurality of pixels in parallel; and executing parallel generation processing of halftone data of the pixels.

16. The halftone generation method as claimed in claim 14 ~~or~~ 15, wherein

said threshold data read means reads all threshold data applied to halftone data generation processing for the scanning line to be processed next to the current scanning line where halftone data generation processing is being executed from the threshold matrix data storage means and outputs the read threshold data to second register means, and

the threshold data retained in said second register means is output to said first register means.

17. The halftone generation method as claimed in claim 16,

wherein

the parallel generation processing of halftone data of the pixels in said plurality of comparison means and the reading of all threshold data applied to halftone data generation processing for the scanning line to be processed next to the current scanning line from said threshold matrix data storage means and the output processing of the read threshold data to said second register means in said threshold data read means are performed in parallel.

18. A halftone generation system for comparing pixel data forming a multilevel image with threshold matrix data, thereby generating halftone data based on the pixel data of the multilevel image,

said halftone generation system comprising:

threshold data read means for reading all threshold data applied to a scanning line for generating a halftone in batch from threshold matrix data storage means for storing threshold matrix data;

threshold data selection means for selecting a plurality of threshold data pieces corresponding to positions of a plurality of pixels for which a halftone is to be generated from among the threshold data pieces read by said threshold data read means and outputting the selected threshold data pieces; and

comparison means for performing comparison processing between the pixel data pieces for which a halftone is to be generated and the threshold data pieces selected by said threshold data selection means in parallel and generating a plurality of halftone data pieces at the same time.

19. A halftone generation system for comparing pixel data forming a multilevel image with threshold matrix data so as to generate halftone data based on the pixel data of the multilevel image,

said halftone generation system comprising:

threshold data read means for reading all threshold data applied to a scanning line for generating a halftone in batch from threshold matrix data storage means for storing threshold matrix data;

first register means for temporarily retaining all threshold data corresponding to the scanning line read by said threshold data read means;

threshold data selection means for selecting a plurality of threshold data pieces corresponding to positions of a plurality of pixels for which a halftone is to be generated from among all the threshold data pieces corresponding to the scanning line retained in said first register means and outputting the selected threshold data pieces;

second register means for temporarily retaining the selected and output threshold data pieces; and

comparison means for performing comparison processing between the pixel data pieces for which a halftone is to be generated and the threshold data pieces retained in said second register means in parallel and generating a plurality of halftone data pieces at the same time, wherein

the threshold data read processing performed by said threshold data read means, the threshold data selection processing performed by said threshold data selection means, and the halftone data generation processing performed by said comparison means are executed in parallel as pipeline processing

in units of pixels.

20. The halftone generation system as claimed in claim 18 ~~or 19~~, wherein

said threshold data read means reads all threshold data applied to the scanning line for generating a halftone from said threshold matrix data storage means for storing threshold matrix data by accessing memory once.

21. The halftone generation system as claimed in ~~any of claims~~ claim 18 ~~to 20~~, wherein

when the number of all threshold data pieces contained in the scanning line for processing is M, the number of pixels of halftone data generated at the same time is P, and the start pixel position of selected threshold data is S,

said threshold data selection means selects P consecutive threshold data pieces containing the S'th threshold data piece from the top as the start position from among the M threshold data pieces and outputs the selected threshold data pieces and if the number of the S'th threshold data piece and the later of the M threshold data pieces is less than P, said threshold data selection means selects the S'th threshold data piece and the later plus the threshold data pieces consecutive starting at the top of the threshold data and outputs a total of P threshold data pieces.

22. The halftone generation system as claimed in ~~any of claims~~ claim 18 ~~to 21~~, wherein

said threshold data selection means selects or sorts all threshold data applied to the scanning line read by said threshold data read means in an arbitrary order responsive to the pixel position of generated halftone and outputs the threshold data.

23. The halftone generation system as claimed in claim 22, wherein

said threshold data selection means outputs at the same output timing, a number of threshold data pieces equal to or less than the number of threshold data pieces undergoing comparison processing in parallel in said comparison means.

24. The halftone generation system as claimed in ~~any of claims~~ claim 18 ~~to 23~~, wherein

said threshold data selection means comprises; a crossbar switch circuit, and a switch control circuit for controlling said crossbar switch circuit,

when the number of all threshold data pieces contained in the scanning line for processing is M, said crossbar switch circuit can input all M threshold data pieces at the same time, and

said switch control circuit controls said crossbar switch circuit so as to select only the threshold data corresponding to

the pixel position of generated halftone from among the M threshold data pieces input to said crossbar switch circuit and output the selected threshold data.

25. The halftone generation system as claimed in ~~any of claims~~ claim 18 ~~to 23~~, wherein

said threshold data selection means comprises; a barrel shifter circuit and a shift control circuit for controlling the shift amount of the barrel shifter circuit,

when the number of all threshold data pieces contained in the scanning line for processing is M, the barrel shifter circuit can input all M threshold data pieces at the same time,

said shift control circuit controls the shift amount of the M threshold data pieces input to said barrel shifter circuit in response to the pixel position of generated halftone.

26. The halftone generation system as claimed in claim 24, wherein

said threshold data selection means further comprises:

a multiplexer circuit for sorting M threshold data pieces divided into blocks each consisting of a plurality of threshold data pieces in block units; and

block-unit threshold data register means for temporarily retaining the M threshold data pieces sorted in block units by said multiplexer circuit, and

said crossbar switch circuit inputs the threshold data pieces sorted in block units and retained in said block-unit threshold data register means.

27. The halftone generation system as claimed in claim 25, wherein

said threshold data selection means further comprises:

a multiplexer circuit for sorting M threshold data pieces divided into blocks each consisting of a plurality of threshold data pieces in block units; and

block-unit threshold data register means for temporarily retaining the M threshold data pieces sorted in block units by said multiplexer circuit,

said barrel shifter circuit inputs the threshold data pieces sorted in block units and retained in said block-unit threshold data register means.

28. The halftone generation system as claimed in claim 25 ~~or 27~~, wherein

said barrel shifter circuit forming a part of said threshold data selection means comprises; a right barrel shifter circuit which inputs the M threshold data pieces and can shift the data only right, and a left barrel shifter circuit which inputs the M threshold data pieces and can shift the data only left in combination, and

said threshold data selection means further comprises; a selector circuit for selecting the threshold data output from either said right or left barrel shifter circuit.

29. A halftone generation method for comparing pixel data forming a multilevel image with threshold matrix data so as to generate halftone data based on the pixel data of the multilevel image,

said halftone generation method comprising:

the threshold data read step of reading all threshold data applied to a scanning line for generating a halftone in batch from threshold matrix data storage means for storing threshold matrix data;

the threshold data selection step of selecting a plurality of threshold data pieces corresponding to positions of a plurality of pixels for which a halftone is to be generated from among the threshold data pieces read at the threshold data read step and outputting the selected threshold data pieces; and

the comparison step of performing comparison processing between the pixel data pieces for which a halftone is to be generated and the threshold data pieces selected at the threshold data selection step in parallel and generating a plurality of halftone data pieces at the same time.

30. A halftone generation method for comparing pixel data forming a multilevel image with threshold matrix data so as to generate halftone data based on the pixel data of the multilevel image,

said halftone generation method comprising:

the threshold data read step of reading all threshold data applied to a scanning line for generating a halftone in batch from threshold matrix data storage means for storing threshold matrix data;

the step of temporarily retaining all threshold data corresponding to the scanning line read at said threshold data read step in first register means;

the threshold data selection step of selecting a plurality of threshold data pieces corresponding to positions of a plurality of pixels for which a halftone is to be generated from among all the threshold data pieces corresponding to the scanning line retained in said first register means and outputting the selected threshold data pieces;

the step of temporarily retaining the selected threshold data pieces in second register means; and

the comparison step of performing comparison processing between the pixel data pieces for which a halftone is to be generated and the threshold data pieces retained in said second register means in parallel and generating a plurality of halftone data pieces at the same time, wherein

the threshold data read processing performed at said threshold data read step,

the threshold data selection processing performed at said threshold data selection step, and

the halftone data generation processing performed at said comparison step are executed in parallel as pipeline processing in units of pixels.

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A

31. The halftone generation method as claimed in claim 29 ~~or 30~~, wherein

A

the threshold data selection step selects or sorts all threshold data applied to the scanning line read at the threshold data read step in an arbitrary order responsive to the pixel position of generated halftone and outputs the threshold data.

A

32. The halftone generation method as claimed in ~~any of claims 29 to 31~~ claim 29, wherein

said threshold data selection step further comprises:

the step of sorting threshold data pieces divided into blocks each consisting of a plurality of threshold data pieces in block units; and

the step of selecting or sorting the threshold data pieces sorted in block units in threshold data units and outputting the threshold data.

33. A halftone generation system for simultaneously generating halftone data of a plurality of pixels for each painting object of text and graphics, said halftone generation system comprising:

data storage means for storing binary matrix data pieces equal in number to the tone values formed by binarizing all the tone values of a painting object to be processed;

data reading means for reading a predetermined amount of binary matrix data pieces of a scan line under processing from said data storage means in accordance with tone information and pixel position information of a painting object under processing; and

data select means for selecting binary matrix data of a plurality of pixels from the binary matrix data read out of said data reading means in accordance with main-scanning direction pixel position information of a painting object under processing, and outputting the resultant.

34. A halftone generation system which simultaneously generates halftone data of a plurality of pixels for each painting object of text and graphics, and then simultaneously writes the halftone data of a plurality of pixels into an output buffer memory, said halftone generation system comprising:

data storage means for storing binary matrix data pieces equal in number to the tone values formed by binarizing all the

tone values of a painting object to be processed;

data reading means for reading a predetermined amount of binary matrix data pieces of a scan line under processing from said data storage means in accordance with tone information and pixel position information of a painting object under processing;

data select means for selecting binary matrix data of a plurality of pixels from the binary matrix data read out of said data reading means in accordance with main-scanning direction pixel position information of a painting object under processing, and outputting the resultant; and

means for writing data representative of the result of ANDing the binary matrix data read out of said data select means and mask data indicative of a paint-out area of the painting object into the output buffer memory.

35. The halftone generation system as claimed in claim 33, wherein

said data reading means simultaneously reads out all the binary matrix data pieces of a scan line under processing from said data storage means in accordance with sub-scanning direction pixel position information of a painting object under processing.

36. The halftone generation system as claimed in claim 33, wherein

said data reading means reads out the binary matrix data

pieces of a scan line under processing from said data storage means in accordance with main-scanning and sub-scanning direction pixel position information of a painting object under processing.

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37. The halftone generation system as claimed in claim 33, wherein

said data select means successively shifts the binary matrix data read out by said data reading means till a halftone data generation process of a scan line under processing ends in execution thereof, in accordance with a shift of a main-scanning direction pixel position of the painting object to a main-scanning direction pixel position of the binary matrix data.

FIG. 1

1p MULTILEVEL IMAGE DATA

2p THRESHOLD MATRIX DATA STORAGE MEANS

3p THRESHOLD DATA READ MEANS

4p REGISTER MEANS

5p THRESHOLD DATA SELECTION MEANS

6p PLURALITY OF COMPARISON MEANS

7p BINARY IMAGE DATA

FIG. 2

1p MULTILEVEL IMAGE DATA

2'p THRESHOLD MATRIX DATA MEMORY

6'p COMPARATOR

7'p BINARY IMAGE DATA

8p ADDRESS GENERATION SECTION

9p THRESHOLD DATA

FIG. 3

A. IMAGE DATA

SCAN SIGNAL

SCANX

SCANY

1 MULTILEVEL IMAGE DATA 1p

MULTILEVEL IMAGE DATA 2p

MULTILEVEL IMAGE DATA 8p

20p THRESHOLD DATA READ CONTROL CIRCUIT

21p THRESHOLD MATRIX DATA MEMORY

22p LATCH

23p SHIFT REGISTER 1 p

24p THRESHOLD DATA SELECTION CONTROL CIRCUIT

25p SHIFT REGISTER 2p

26p DATA SELECTOR 1p DATA SELECTOR 2p DATA SELECTOR 8p

27p COMPARATOR 1p

COMPARATOR 2p

COMPARATOR 8p

28p BUFFER MEMORY WRITE CONTROL CIRCUIT

29p BUFFER MEMORY

30p RECORDER

FIG. 4

A. IMAGE DATA

SCAN SIGNAL

SCANX

SCANY

B. TO COMPARATOR

20p THRESHOLD DATA READ CONTROL CIRCUIT

21p THRESHOLD MATRIX DATA MEMORY

22p LATCH 1p

23p SHIFT REGISTER 1p

24p THRESHOLD DATA SELECTION CONTROL CIRCUIT

25p SHIFT REGISTER 2p

26p DATA SELECTOR 1p DATA SELECTOR 2p DATA SELECTOR 8p

31p REGISTER

FIG. 6

A. THRESHOLD MATRIX DATA MEMORY

B. LATCH 1p

C. 53-BIT SHIFT REGISTER

D. SHIFT DIRECTION

E. 53-BIT SHIFT REGISTER

F. 53-BIT SHIFT REGISTER

G. SHIFT REGISTER 1p

FIG. 7

A. TO DATA SELECTOR 1p

B. TO DATA SELECTOR 2p

C. FROM SHIFT REGISTER 1p

D. FROM SHIFT REGISTER 1p

E. FROM SHIFT REGISTER 1p

FIG. 8

A. BEFORE SHIFT IN SHIFT REGISTER 2p OCCURS

(INITIAL STATE)

B. UNIT OF THRESHOLD DATA (PIECES) OUTPUT TO A PLURALITY OF COMPARISON MEANS

C. AFTER TERMINATION OF FIRST SHIFT

D. UNIT OF THRESHOLD DATA (PIECES) OUTPUT TO A PLURALITY OF COMPARISON MEANS

E. SHIFT BY TWO DATA PIECES

F. AFTER TERMINATION OF SECOND SHIFT

G. UNIT OF THRESHOLD DATA (PIECES) OUTPUT TO A PLURALITY OF COMPARISON MEANS

H. SHIFT BY TWO DATA PIECES

FIG. 9

A. IMAGE DATA

SCAN SIGNAL

SCANX

SCANY

IMAGE TOP

ADDRESS PIX

IMAGE LENGTH LX

B. TO COMPARATOR

20p THRESHOLD DATA READ CONTROL CIRCUIT

21p THRESHOLD MATRIX DATA MEMORY

22p LATCH 1p

24p THRESHOLD DATA SELECTION CONTROL CIRCUIT

25p SHIFT REGISTER 2p

26p DATA SELECTOR 1p

DATA SELECTOR 2p

DATA SELECTOR 8p

32p SHIFT REGISTER 10p

FIG. 10

A. IMAGE DATA

SCAN SIGNAL

SCANX

SCANY

IMAGE TOP

ADDRESS PIX

IMAGE LENGTH LX

B. TO COMPARATOR

20p THRESHOLD DATA READ CONTROL CIRCUIT

21p THRESHOLD MATRIX DATA MEMORY

22p LATCH 1p

24p THRESHOLD DATA SELECTION CONTROL CIRCUIT

25p SHIFT REGISTER 2p

26p DATA SELECTOR 1p

DATA SELECTOR 2p

DATA SELECTOR 8p

33p SHIFT REGISTER 11p

34p SHIFT REGISTER 12p

FIG. 11

A. TO SHIFT REGISTER 2p

TO SHIFT REGISTER 2p

TO SHIFT REGISTER 2p

B. FROM LATCH 1p

C. 31 SIMILAR SETS FOLLOW

FIG. 12

1 MULTILEVEL IMAGE DATA

2 THRESHOLD MATRIX DATA STORAGE MEANS

3 THRESHOLD DATA READ MEANS

4 THRESHOLD DATA SELECTION MEANS

5 COMPARISON MEANS

6 BINARY IMAGE DATA

FIG. 13

A. OBJECT TYPE otype

COLOR BEING PROCESSED color

PIXEL POSITION cx0, cy0

B. MULTILEVEL IMAGE DATA 0

MULTILEVEL IMAGE DATA 1

MULTILEVEL IMAGE DATA ws-1

11 THRESHOLD DATA READ CONTROL CIRCUIT

12 THRESHOLD MATRIX DATA MEMORY

13 THRESHOLD DATA FETCH REGISTER

14 THRESHOLD DATA SELECTION CONTROL CIRCUIT

15 CROSSBAR SWITCH

16 THRESHOLD DATA REGISTER

17 COMPARATOR 0

COMPARATOR 1

COMPARATOR ws-1

18 OUTPUT REGISTER

19 BUFFER MEMORY WRITE CONTROL CIRCUIT

20 BUFFER MEMORY

21 RECORDER

FIG. 14

A. ADDRESS

B. TEXT THRESHOLD MATRIX (COLUMN 0)

C. GRAPHICS THRESHOLD MATRIX (COLUMN 0)

D. RASTER THRESHOLD MATRIX (COLUMN 0)

E. TEXT THRESHOLD MATRIX (COLUMN 1)

F. GRAPHICS THRESHOLD MATRIX (COLUMN 1)

G. RASTER THRESHOLD MATRIX (COLUMN 1)

H. TEXT THRESHOLD MATRIX (COLUMN ts-1)

I. GRAPHICS THRESHOLD MATRIX (COLUMN ts-1)

J. RASTER THRESHOLD MATRIX (COLUMN ts-1)

K. CYAN THRESHOLD MATRIX

L. MAGENTA THRESHOLD MATRIX

M. YELLOW THRESHOLD MATRIX

N. BLACK THRESHOLD MATRIX

FIG. 17

A. BINARY DECODER TRUTH TABLE

B. INPUT

C. OUTPUT

FIG. 18

13 THRESHOLD DATA FETCH REGISTER

16 THRESHOLD DATA REGISTER

FIG. 21

A. MULTILEVEL IMAGE DATA

B. TO COMPARATOR 0

C. TO COMPARATOR 1

D. TO COMPARATOR 2

E. TO COMPARATOR 3

13 THRESHOLD DATA FETCH REGISTER

16 THRESHOLD DATA REGISTER

FIG. 22

A. MULTILEVEL IMAGE DATA

B. TO COMPARATOR 0

C. TO COMPARATOR 1

D. TO COMPARATOR 2

E. TO COMPARATOR 3

F. TO COMPARATOR 4

G. TO COMPARATOR 5

H. TO COMPARATOR 6

I. TO COMPARATOR 7

13 THRESHOLD DATA FETCH REGISTER

16 THRESHOLD DATA REGISTER

FIG. 23

1 MULTILEVEL IMAGE DATA

6 BINARY IMAGE DATA

7 ADDRESS GENERATION SECTION

8 THRESHOLD MATRIX DATA MEMORY

9 COMPARATOR

10 THRESHOLD DATA

FIG. 24

A. OBJECT TYPE otype

COLOR BEING PROCESSED color

PIXEL POSITION cx0, cy0

1 MULTILEVEL IMAGE DATA 0

MULTILEVEL IMAGE DATA 1

MULTILEVEL IMAGE DATA ws-1

11 THRESHOLD DATA READ CONTROL CIRCUIT

12 THRESHOLD MATRIX DATA MEMORY

13 THRESHOLD DATA FETCH REGISTER

14 THRESHOLD DATA SELECTION CONTROL CIRCUIT

16 THRESHOLD DATA REGISTER

17 COMPARATOR 0

COMPARATOR 1

COMPARATOR ws-1

18 OUTPUT REGISTER

19 BUFFER MEMORY WRITE CONTROL CIRCUIT

20 BUFFER MEMORY

21 RECORDER

22 BARREL SHIFTER

FIG. 25

13 THRESHOLD DATA FETCH REGISTER

16 THRESHOLD DATA REGISTER

FIG. 26

13 THRESHOLD DATA FETCH REGISTER

16 THRESHOLD DATA REGISTER

A. MULTILEVEL IMAGE DATA

FIG. 27

13 THRESHOLD DATA FETCH REGISTER

16 THRESHOLD DATA REGISTER

A. MULTILEVEL IMAGE DATA

FIG. 29

A. OBJECT TYPE otype

COLOR BEING PROCESSED color

PIXEL POSITION cx0, cy0

1 MULTILEVEL IMAGE DATA 0

MULTILEVEL IMAGE DATA 1

MULTILEVEL IMAGE DATA ws-1

11 THRESHOLD DATA READ CONTROL CIRCUIT

12 THRESHOLD MATRIX DATA MEMORY

13 THRESHOLD DATA FETCH REGISTER

14 THRESHOLD DATA SELECTION CONTROL CIRCUIT

16 THRESHOLD DATA REGISTER

17 COMPARATOR 0

COMPARATOR 1

COMPARATOR ws-1

18 OUTPUT REGISTER

19 BUFFER MEMORY WRITE CONTROL CIRCUIT

20 BUFFER MEMORY

21 RECORDER

221 LEFT BARREL SHIFTER

222 RIGHT BARREL SHIFTER

223 SELECTOR

FIG. 30

13 THRESHOLD DATA FETCH REGISTER

16 THRESHOLD DATA REGISTER

FIG. 31

49 COMPARATOR

51 SELECTOR

FIG. 32

A. OBJECT TYPE otype

COLOR BEING PROCESSED color

PIXEL POSITION cx0, cy0

1 MULTILEVEL IMAGE DATA 0

MULTILEVEL IMAGE DATA 1

MULTILEVEL IMAGE DATA ws-1

11 THRESHOLD DATA READ CONTROL CIRCUIT

12 THRESHOLD MATRIX DATA MEMORY

13 BLOCK 0 THRESHOLD DATA FETCH REGISTER BLOCK n-1

14 THRESHOLD DATA SELECTION CONTROL CIRCUIT

16 THRESHOLD DATA REGISTER

17 COMPARATOR 0

COMPARATOR 1

COMPARATOR ws-1

18 OUTPUT REGISTER

19 BUFFER MEMORY WRITE CONTROL CIRCUIT

20 BUFFER MEMORY

21 RECORDER

22 BARREL SHIFTER

23 MULTIPLEXER

24 THRESHOLD DATA FETCH REGISTER 2

FIG. 33

13 THRESHOLD DATA FETCH REGISTER

24 THRESHOLD DATA FETCH REGISTER 2

FIG. 34

16 THRESHOLD DATA REGISTER

24 THRESHOLD DATA FETCH REGISTER 2

A. MULTILEVEL IMAGE DATA

FIG. 35

16 THRESHOLD DATA REGISTER

24 THRESHOLD DATA FETCH REGISTER 2

A. MULTILEVEL IMAGE DATA

FIG. 37A

A. THRESHOLD MATRIX DATA (MULTILEVEL)

B. MATRIX DATA

FIG. 37B

A. BINARY MATRIX DATA

B. MATRIX DATA

C. GRADATION VALUE

FIG.38

A. MASK DATA

B. WRITE MODE CONTROL SIGNAL

C. PIXEL LOCATION IN MAIN-SCANNING DIRECTION INFORMATION

D. PIXEL LOCATION IN SUB-SCANNING DIRECTION INFORMATION

E. COLOR IDENTIFICATION INFORMATION

F. GRADATION INFORMATION

FIG.40

10q BINARY MATRIX DATA STORAGE MEMORY

22q BINARY MATRIX DATA FETCH REGISTER

32q BARREL SHIFTER

FIG.41

A. STORAGE STATUS OF BINARY MATRIX DATA FETCH REGISTER 22q

B. RANGE OF OUTPUT DATA

C. 1st DATA OUTPUT

D. 2ND DATA OUTPUT

FIG.43

10q BINARY MATRIX DATA STORAGE MEMORY

21q BINARY MATRIX DATA READING CONTROL CIRCUIT

22q BINARY MATRIX DATA FETCH REGISTER

30q BAINARY MATRIX DATA SELECTING MEANS

31q BINARY MATRIX DATA SELECT CONTROL CIRCUIT

32q BARREL SHIFTER

40q BINARY DATA WRITE CONTROL CIRCUIT

50q OUTPUT BAFFER MEMORY

100q HALF-TONE GENERATING UNIT

200q IMAGE RECORDING UNIT

A. MASK DATA

B. WRITE MODE CONTROL SIGNAL

C. PIXEL LOCATION IN MAIN-SCANNING DIRECTION INFORMATION

D. PIXEL LOCATION IN SUB-SCANNING DIRECTION INFORMATION

E. COLOR IDENTIFICATION INFORMATION

F. GRADATION INFORMATION

FIG.44

10q BINARY MATRIX DATA STORAGE MEMORY

FIG.45

10q BINARY MATRIX DATA STORAGE MEMORY

22q BINARY MATRIX DATA FETCH REGISTER

32q BARREL SHIFTER

220q DATA SELECTOR

221q REGISTER

222q REGISTER

FIG.46

22q BINARY MATRIX DATA FETCH REGISTER

32b1q DATA SELECTOR

32b2q DATA SELECTOR

32b3q DATA SELECTOR

32b8q DATA SELECTOR

32q BARREL SHIFTER

FIG.47

10q BINARY MATRIX DATA STORAGE MEMORY

FIG.48

1q ADDRESS GENERATION SECTION

2q THRESHOLD MATRIX DATA MEMORY

3q COMPARATOR

A. INPUT MULTI-VALUE IMAGE DATA

B. THRESHOLD MATRIX DATA

C. BINARY MATRIX DATA